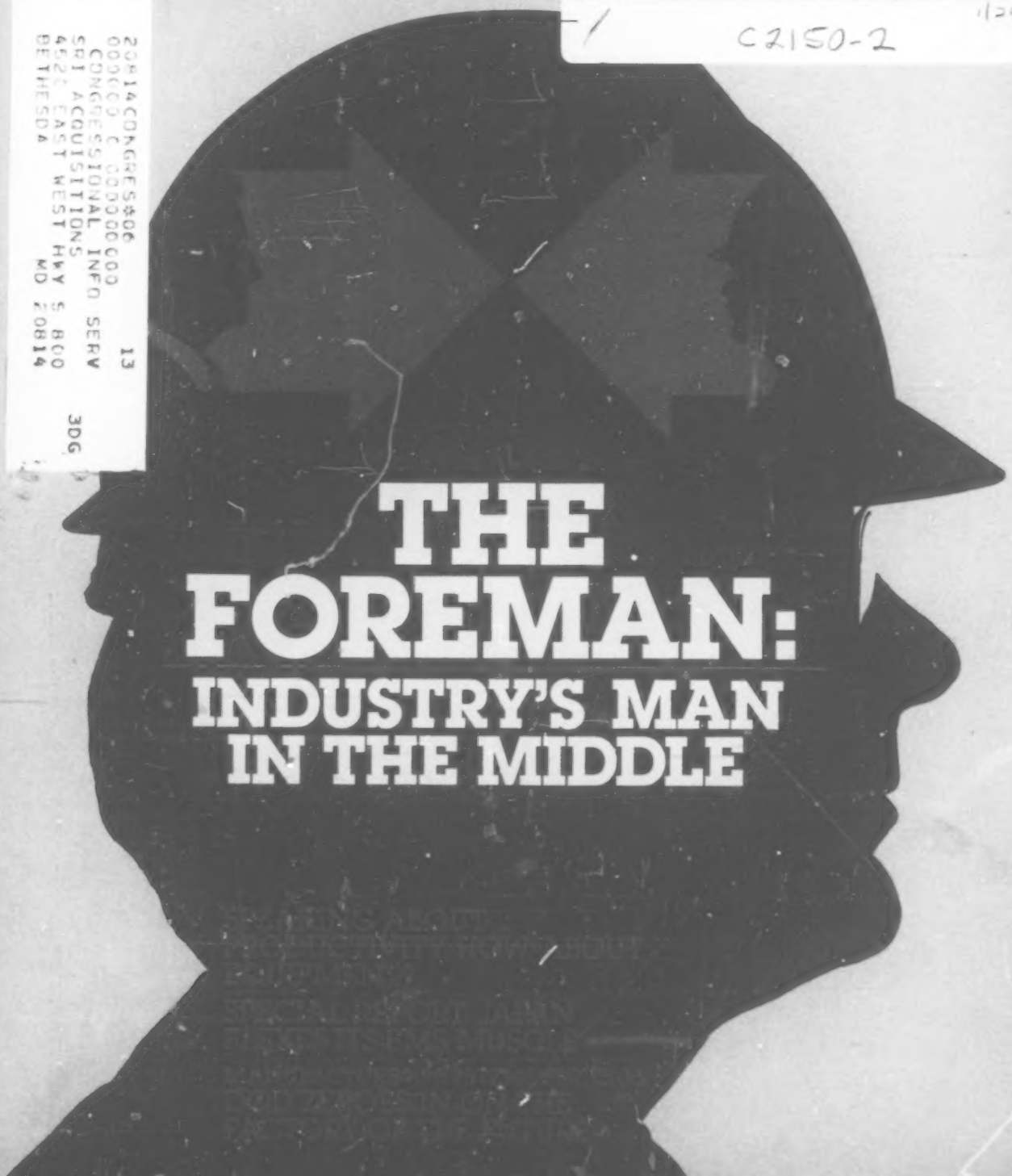
Chilton's
JANUARY 21, 1983

IRON AGE

THE MAGAZINE FOR METALWORKING MANAGEMENT

3
1/24/83
C2150-2



THE FOREMAN: INDUSTRY'S MAN IN THE MIDDLE

VOL. 226, NO. 3

IRON AGE

JANUARY 21, 1983

COVER STORY

36 INDUSTRY'S MAN IN THE MIDDLE
The foreman—always management's point man on the shop floor—is really on the spot in the fiercely competitive 1980s.

FEATURES

24 PRECISION MACHINING REPORTS A GRUDGING UPSWING
The worst is past. Many believe a "real" recovery will be felt in the second half of 1983.

28 FOR NICKEL, 1983 WILL BE MAKE IT OR BREAK IT
The usual obstacles exist—inventories, interest rates, price pressures and lackluster consumption.

41 PRODUCTIVITY OF EQUIPMENT SINKS FURTHER
The long-lagging economy that has forced manufacturing plants to operate well below optimum levels is the chief cause.

48 MMS SERIES 36: THE FACTORY OF THE FUTURE
The U.S. Air Force ICAM project is paving the way to manufacturing efficiency and plant productivity in the aerospace industry.

56 JAPAN FLEXES ITS FMS MUSCLE
Robots, CAD/CAM and NC played big roles at the Osaka exhibition, but the star was the flexible manufacturing system.

NEWSFRONTS

7 EDITORIAL
Changing thoughts on the outskirts of town?

13 METALWORKING NEWSFRONT
A Federal appeals court rejects a challenge to the EPA's stiff penalties for failing to comply with air pollution rules.

23 BUSINESS FINANCEFRONT
Salaries of top metals executives rose by an average of 12 pct in 1981, slightly below the rate for all industries.

32 METALWORKING ORDER TRENDS
The latest data shows orders moving up a bit. But weary waiters for recovery don't yet see an end to their wait.

34 YOU AND YOUR JOB
What are the best routes to the executive suite? A comprehensive survey tells that—plus a whole lot more.

44 TECHFRONT
Acoustic emission has stepped into a new role. It's being used to test graphite-reinforced metal matrix wires.

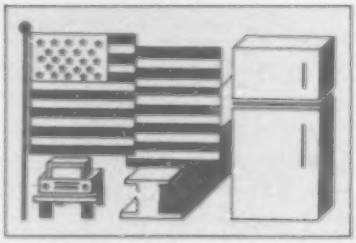
62 MATERIALS NEWSFRONT
Steel shipments should increase in the first quarter, the upturn buoyed by an auto sales rebound and seasonal factors.

68 BUSINESS FORECAST
With the nation's jobless rate at 10.8 pct in December, the employment picture isn't getting any brighter.

DEPARTMENTS

8 EDITORIAL STAFF
8 LETTERS
58 BUSINESS STAFF
58 AD INDEX
59 MANAGEMENT SERVICE CARD
63 P&P DATA 1/10
64 FERROUS SCRAP 1/10
66 CLEARING HOUSE

NEXT ISSUE



Domestic content legislation—why it won't fly

IRON AGE (ISSN 0164-5137) is published 36 times a year with a frequency of every 10 days appearing on a Monday-Wednesday-Friday cycle of every month by CHILTON COMPANY, Chilton Way, Radnor, PA 19089. Chilton Co. is a division of American Broadcasting Companies, Inc., New York, N.Y. Second Class Postage Paid at Wayne, PA 19087 and additional mailing offices. IRON AGE is sent on a controlled free basis to qualified managers in U.S. metalworking companies. Non-metalworking companies, services, government, institutions, schools and colleges, $55 one year. Canada, $55 year. Foreign, $65 one year. Single copies, $2.50. Cable Chilton, Philadelphia.
Send address changes to IRON AGE, P.O. Box 2040, Radnor, PA 19089

FOR NICKEL, 1983 WILL BE MAKE IT, OR BREAK IT

The usual obstacles exist—inventories, interest rates, price pressures and lackluster consumption.

BY ROBERT J. REGAN

The nickel industry can't quite see the light at the end of the tunnel yet—but it knows it's there. Meanwhile, producers find themselves forced to grope past the same sort of obstacles that impeded the path through 1982.

The familiar obstacles include nettlesome inventories, interest rates, price pressures from merchants and the London Metal Exchange, Russian sales and, last but not least, lackluster consumption.

With large chunks of their mining, smelting and refining operations idle, the producers are loath to see things only in terms of overcapacity. Here the assessments vary as widely as definitions of true, nameplate and practicable capacity. And more recently there has been more willingness to discuss things—theoretically, at least—in terms of survivable capacity.

Inco Ltd. Chairman Charles F. Baird put it succinctly at a recent meeting with security analysts in New York during a discussion of various nickel market scenarios when he said 1983 is "likely to be a kind of make-or-break year for a lot of people in the industry."

In the same vein, Mr. Baird observed that, if the L.M.E. price stayed in a range of $1.50 to $1.60 a lb very long, "I would predict that a great many producers will go down, because many of them will be producing at costs that would not only exceed the price at which they are selling—I'm talking about cash costs—but also foreign exchange costs would exceed the price at which they are selling. How long their sponsors would allow that to go on is hard to say."

Mr. Baird added, however, that "things change and we wouldn't expect current (price) trends to continue, particularly if there is an upturn in demand generally—and in people's outlooks." At that point, a Wood Gundy research analyst observed that, if the nickel price remained well under $2 a lb, well below Inco's cash costs, it would seem advisable not to produce in order to lessen the cash drain. Swinging the hypothetical discussion in the other direction, he then asked "looking at another scenario, does it pay to produce to encourage some of the marginal producers to get out a little sooner?"

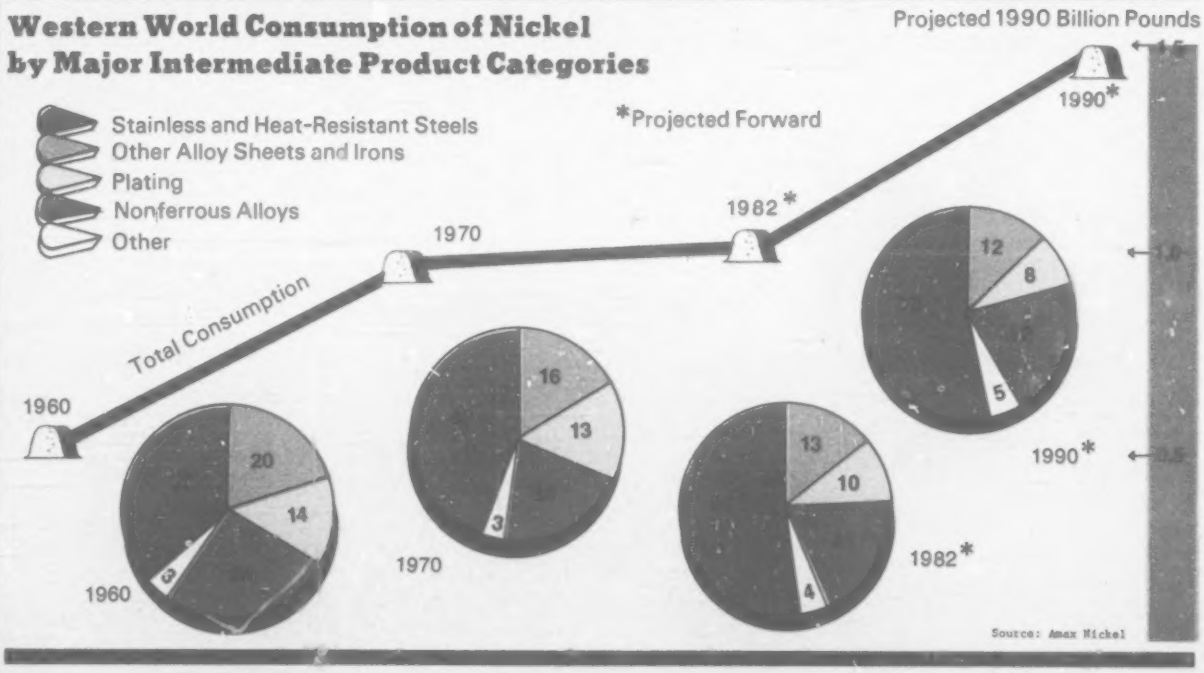
Mr. Baird replied that this was the sort of question Inco "wrestles with every day and it gets tougher to make these computations because not all of us in the business are worried about the same kinds of concerns. Not all of us face the financial marketplace, but that's the kind of trade-off we have to worry about."

The Wood Gundy analyst then speculated that, if Inco helped Amax Nickel reduce inventory and help take materials close to production, "you'd be driving them deeper into a cash hole—you'd have nickel at a much lower price . . . you can't lose, except when you want $3 a lb."

Mr. Baird assented, adding "it's a very difficult set of computations, but something, we think, is likely to happen in a variety of directions in 1983. It's likely to be a kind of make-or-break year for a lot of people in the industry."

The L.M.E. price had zig-zagged its

Western World Consumption of Nickel by Major Intermediate Product Categories



way up to $1.72 a lb by the start of 1983, but was sagging back toward $1.60 a lb as the first week of the new year drew to a close.

Inco calculates that noncommunist world demand for nickel fell back to 1.0 billion lbs last year but should climb back up to 1.1 billion lbs this year—which would put it only back where it was in the middle of the industry's first three-straight-years drop since World War II.

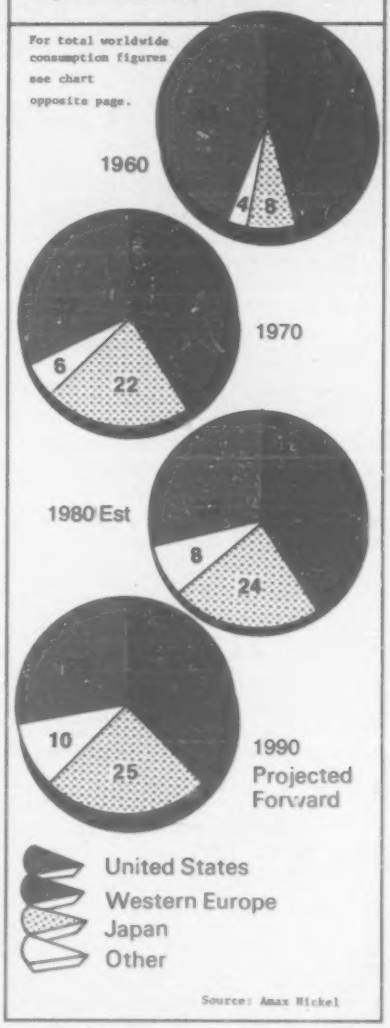
Amax Nickel, which has scheduled a two-month summer shutdown for its Port Nickel, La. refinery, doesn't expect much increase in nickel consumption in the U.S. Overall western bloc nickel consumption, says James Alward, manager, marketing research, "is expected to be around 1 billion lbs—some 20 million lbs more than in 1982." Noting that this is almost entirely based on current economic forecasts (in Amax Nickel's case, Chase Econometrics and Townsend-Greenspan), Mr. Alward said most of the modest increase forecast for U.S. industrial production will take place in the last quarter. "Assuming a time lag of at least several months between variations in industrial production and nickel consumption, we feel that little, if any increase in nickel consumption will be evident in the U.S. in 1983." Mr. Alward also said Japanese nickel use should be up 2 pct, based on forecasts of a 4.6 pct increase in industrial production there.

Michel Frippel, director of marketing for Amax Nickel, said it is difficult to say whether there will be a restructuring of the world nickel industry without knowing how long the present economic slump will last. "Obviously, if it continues for a few years, quite a few companies will be shut down. The largest companies are not necessarily those that will survive the longest, however. Companies don't fail mainly because of market conditions. They fail mainly because of an internal deteriorating financial structure and, in particular, cash flow problems," he says.

Mr. Frippel also observed that a mine shutdown does not mean that a facility will cease production over an extended period of time because, "when prices rise, these operations can usually be brought back in a short period."

L.G. Bonar, vice president, marketing and sales for Falconbridge Nickel Mines Ltd., sees practicable western world nickel capacity a lot less than it appears. "Add up all the known nameplate capacity and you get something like 1.7-1.8 billion lbs, but a lot of the capacity now idle will require millions of dollars and a lot of time to turn around. Figuring on a basis of a three-month turnaround, I would estimate practicable capacity at about 1.3 billion lbs," he said.

Nickel Consumption by Geography



Mr. Bonar said the nickel industry still faces just about the same set of problems that existed last year, but finds them smaller in scope. He said last year's production cutting should start showing up in this year's inventory numbers, "and producer stocks have been the driving force behind the pressures on the nickel price." The Falconbridge official said it is difficult to say what effect a static consumption picture will have in the nickel-producing community because no one can predict what sort of rescue operations would be mounted by interested parties, be they governments, creditors or parent companies.

As far as the present supply/demand situation is concerned, Mr. Frippel said "the good news is that, for the first time in many years, no one is investing in new nickel capacity. The bad news is that today's western bloc effective capacity is some 60 pct more than western bloc nickel consumption."

Mr. Frippel estimated effective western nickel capacity, including capacity that could be brought back onstream in one year, at about 1.6 billion lbs. He also noted that Amax Nickel now is estimating a growth rate of somewhat under 3 pct a year over the next 10 years. A year earlier, Amax Nickel was forecasting a 3.7 pct growth rate. Mr. Frippel said long term forecasts usually are based on economic and technological factors and, while the company has been reasonably accurate on the technological front, the 3.7 pct figure had to give way to continually revised economic projections.

Mr. Frippel said nickel inventories "are fairly low in both consumers' and producers' hands so that, if nickel consumption increases fairly rapidly, they could be a temporary tightening of the distribution pipeline and a building of inventories in consumers' hands.

"The problem is that most companies involved in either consuming or producing nickel lack the financial resources to purposely build up inventories at this time."

The Amax Nickel official said the problems encountered by western bloc mining and metals companies today "are not due to any inherent fault in management, whether in the U.S., Japan or Europe. Certainly some companies have been managed better than others, but even the better-managed firms are in trouble. I doubt very much that any nickel producer is making a profit in today's market—and, to make matters worse, world growth trends are just not there.

"The economies of the western world are in bad shape and until they pick up we all will be in trouble. The nickel industry cannot sell to a non-consuming stainless steel industry; the stainless steel industry cannot sell to a non-consuming capital goods industry; the capital goods industry cannot sell to a non-consuming consumer goods industry and the consumer goods industry cannot supply a non-consuming consumer.

"We are all fighting for a decreasing piece of the consumption pie but only elected officials at top levels can eventually succeed in increasing the size of that pie. If they fail to do so—and I don't think that will be the case—more than the world's nickel industry will be in trouble." □

Reprints available while supply lasts. For single copy, circle No. 95 on inquiry card. Additional copies, $1.00 each, for articles up to 8 pages. Longer ones $2.00 each. Please include payment with orders of $10 or less. Quantity reprints available. For information, write: IRON AGE, Reader Service, Chilton Way, Radnor, Pa. 19089. Ask for reprint No. 4281.

METALWORKING ORDER TRENDS

Here and there a good sign, but not enough to spring a recovery

Orders for durable goods, including metalworking, were up in November.

But those in the cheering section were still sitting on their hands. They have been through the monthly up-and-down routine too long to get stirred up by another upward blip in the orders chart.

The weary waiters for recovery are acutely aware that in the 11 months of 1982 that have been reported on, orders rose in five of the months and fell in six.

And they know that November followed a weak month for orders. In October, orders were down by more than 5 pct from the previous month.

What is needed now is about three straight months of solid, across-the-board gains. Then, the cheering section might throw some hats in the air.

November could be the start of something, of course. Orders did move up. Orders received by durable goods producers came to $70.6 billion, up 1.4 pct from October. And the November gain was the third one over the last five-month period.

In November—as has held true enough through recent months—there did not appear to be any one metalworking industry taking a role in leading a rally out of the recession. Orders in some industries were up; others were down. Some gains, on a percentage basis, did look promising.

Orders for electrical machinery scored an 8.2 pct gain in November. In this industry group, the largest increase in orders was for defense communications systems.

New orders received by primary metals producers rose by 7.9 pct in November. That was the largest one-month increase for metals orders since January 1980.

Transportation equipment orders broke out of a three-month slide with a modest 1.5 pct increase in November. Within this industry group, orders for motor vehicles and parts were down.

Also down in November, were orders for nonelectrical machinery. These took a sharp decline of more than 6 pct. And this fall was led by a 26 pct drop in orders for machine tools.

It seems the wait for recovery in metalworking may have some time to go. Consumer buying, it appears, is not yet strong enough to push orders through the long supply pipeline back to heavy goods producers.

So far, consumer savings are on the rise, but not spending.

Source: U.S. Dept. of Commerce Billions of dollars, seasonally adjusted monthly total, unless otherwise noted	Latest Month or Qtr.	Previous Month or Qtr.	Same Period Year Ago
Capital Expenditures (Annual Rates)			
U.S. Industry, Total	4th Qtr.	$324.5*	$320.2	$327.8
Manufacturing, Total	4th Qtr.	122.9*	123.1	126.9
Manufacturing, Durable Goods	4th Qtr.	58.8*	60.0	60.8
Mining Industry	4th Qtr.	16.2*	15.7	16.8
Key Indicators, Durable Goods Manufacturing				
New Orders	Nov.	70.6	69.6	80.0
Shipments	Nov.	72.7	72.3	81.6
Inventories	Nov.	179.5	181.8	187.3
Unfilled Orders	Nov.	281.9	284.0	311.0
New Orders, Metalworking				
Capital Goods Producers, Nondefense Industries	Nov.	20.2	20.2	23.8
Capital Goods Producers, Defense Industries	Nov.	4.9	4.8	4.9
Primary Metals, Total	Nov.	7.5	6.9	10.0
Steel (SIC 331)	Nov.	3.1	2.8	5.1
Iron & Steel Castings (SIC 332)	Nov.	0.7	0.6	.9
Nonferrous Metals	Nov.	3.7	3.5	4.0
Nonelectrical Mach.-Equip. Industries, Total	Nov.	13.0	13.8	17.5
Engines & Turbines	Nov.	1.0	1.2	1.3
Farm Machinery & Equipment (Shipments)	Nov.	1.1	1.0	1.2
Construction, Mining & Materials Hdlg. Equip.	Nov.	2.4	2.0	3.6
General Industrial Machinery	Nov.	1.0	1.0	1.4
Fluid Power Equipment** (Index-1972=100)	Nov.	171	146	241
Metalworking Machinery	Nov.	0.6	0.6	0.6
Machine Tools, Total (Millions $, unadjusted)***	Nov.	88.2	119.2	195.8
Machine Tools, Metal-Cutting***	Nov.	62.7	72.9	135.4
Machine Tools, Metal-Forming***	Nov.	25.5	46.3	60.4
Electrical Mach. & Equip. Industries, Total	Nov.	12.0	11.1	11.9
Elec. Transmission Equip. & Industrial Apparatus	Nov.	1.8	1.5	2.0
Household Appliances	Nov.	1.1	1.0	1.1
Communication Equipment	Nov.	4.2	3.7	3.7
Transportation Equip. Industrial, Total	Nov.	14.5	14.3	15.4
Motor Vehicles & Parts (Shipments)	Nov.	8.1	7.9	10.0
Aircraft, Missiles & Parts	Nov.	5.2	5.1	4.0
Shipbuilding & Military Tanks	Nov.	0.9	0.7	1.2
Fabricated Metal Products, Total	Nov.	8.3	8.3	9.3
Instruments, Total	Nov.	3.8	3.7	4.4

*Est.—Commerce Dept.; **Source: National Fluid Power Assn.; ***Source: NMTBA.

INDUSTRY'S MAN

The foreman—always management's point man on the shop floor—is really on the spot in the fiercely competitive 1980s. Here's a plan to help him both survive and thrive.

BY PAUL CATHEY

The first-line supervisors—long known as the men (or women) in the middle—face a staggering challenge in the 1980s.

Middle and top management will be after them to boost productivity, reduce costs and improve quality. And they'll be expected to prove that American workers *can* compete successfully in the global manufacturing race.

In short, foremen will be asked—more than ever before—to make management's goals crystal clear to the workers. And, as it always has been, this will be difficult unless management learns how to communicate with the foremen and trains them to pass along information.

Increasing the foremen's problems in coming years will be the job of directing a work force that will include some robots. And looming up is the factory of the future—that electronics-laden workplace where machines could outnumber people by a wide margin. Even these advanced manufacturing centers will require some sort of first-level supervisor—a sophisticated foreman or possibly a technology steward.

Ever since management decided there had to be a leader on the job floor, the first-line supervisor has been in no-man's land. He's been called "the forgotten man," "the master and victim of double talk," "the marginal man," and other names even less complimentary.

He belongs to everyone—management, the workers, the union (if there is one)—but no one trusts him completely. And, as management's point man in these turbulent times, he's more endangered than ever before.

It's time management recognized that the leader in the trenches is not expendable. He's vital to success in the manufacturing and marketing wars now taking place on a global basis. In this age of video games, the strategy for winning may be management's, but the joy stick operator is the first-line supervisor.

Is there a sound program for making today's, and tomorrow's foreman the kind of point man industry needs? *Iron Age*, based on interviews with corporate managers and consultants, believes there is. Here are its four principal features:

1—Communication with the foreman must be given A-1 priority. And the foreman must be trained, extensively, to communicate with his workers.

"We've been making the same mistake for years," says Roger D'Aprix. He's practice leader for communication at management consultants, Towers, Perrin, Forster & Crosby. And for more than a decade he was manager of employee communication for the business systems group of Xerox Corp.

"We've been haranguing supervisors and foremen on the need to communicate better," he adds. "But we don't tell them what we mean by communication. It's a Catch-22 situation."

Last year, TPF&C and the International Assn. of Business Communicators (IABC) surveyed over 32,000 employees in 26 companies on the subject of communications.

That survey found some surprising differences between how employees prefer to obtain their information and where they actually got it. It also indicated that some of the preferred sources were presently responsible for only a

Where Employees Really Get Their

IN THE MIDDLE

small portion of the information received. (See chart, this page)

The employee's immediate supervisor, for example, was asked to supply more than 90 pct of organizational information, but only came through with a little more than 50 pct. And that ageless, but often accurate, unoffical source of company information—the grapevine—was a source for close to 40 pct of current information. Because of the importance of the role of the supervisor as a source of information, the survey asked employees four questions in that area.

Here are the percentage breakdowns of the answers:

	Pct Agreeing	Pct Disagreeing
My supervisor keeps me well informed	64.9	24.2
My supervisor is kept informed by higher management.	63.3	27.9
My supervisor discusses my job performance once a year.	70.1	25.1
My supervisor lets me know when I do a good job.	59.2	29.2

Clearly there is room for improvement. The results indicate that blue collar workers feel they receive little regular (at least annual) feedback on job performance and, generally, fewer "pats on the back" for a job well done than white collar employees.

Mr. D'Aprix points out that the five sources of information which employees said need the greatest strengthening—top executives, immediate supervisors, orientation programs, small group meetings and upward communication programs—are all face-to-face communication situations.

"Training foremen to give information to the workers won't work," he says, "if they aren't trained how to get information from the workers and if they aren't rewarded for doing a good job as two-way communicators."

The IABC/TPF&C study notes, "Many organizations can improve supervisory communications by giving them the tools they need to be good communicators. These include a steady flow of information about management decisions that affect employees, a good sourcebook on organizational policies and procedures, and training in listening, presentation and other communications skills. And since small group meetings are another highly preferred communication source, organizations might wish to help or train supervisors to conduct such meetings."

2—**Even in this time of advanced technology, the foreman's grasp of human behavior and interpersonal relations must be improved.**

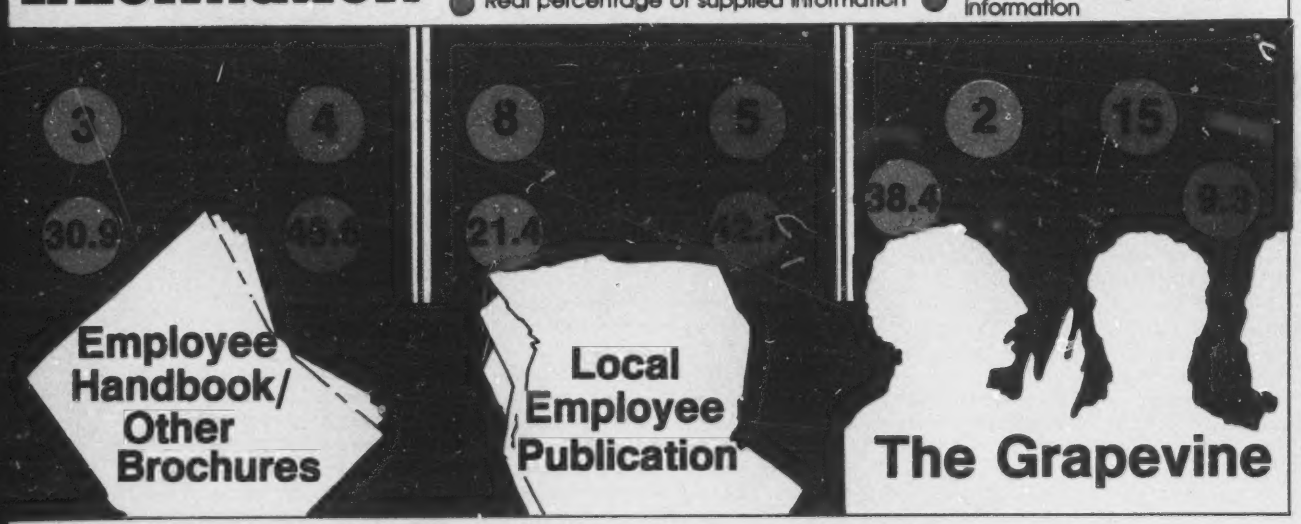
It's certainly true that the foreman must improve his technical knowledge of the work and the machines that do it. Bawling out a robot won't get it back to work after a malfunction. But when it comes to introducing a robot on the line, the foreman will be explaining it to human workers. And management had better prepare him for that task.

"I've seen in countless situations," says Kenton Hofmeister, "a worker or supervisor standing by a robot and saying 'I could have told them the damn thing wouldn't work, but nobody asked me.'" Mr. Hofmeister is manager of consulting services of the supervisory programs group at Development Dimensions International (DDI), consultants specializing in selecting, training and developing managers and supervisors. Previously, he helped direct the introduction of robots into Westinghouse and into Dayton Power and Light.

"There are three ways you can introduce change," he says. "You can ask people, you can tell people or you can surprise people. And people don't like surprises."

He believes the foreman can be management's greatest ally in introducing a robot, or any other change, if he's taken into management's confidence early.

"It's a matter of how you introduce a change," he points out. "Management must first explain to supervisors the reason for making the change, create the climate for making the change, help them understand the problem, ask for



How Armco Trains Foremen

Over a decade ago, Armco Inc. (then Armco Steel) suspected it had a foreman problem.

William J. Saunders, Jr., now executive director of Armco's education center, was then manager of personnel development. He describes what happened.

"Initially," he says, "some simplistic solutions were suggested such as higher base rates, better incentives, overtime compensation and others.

"But the more we looked at the situation, the more we realized we had to have more information and the best source was the foreman himself."

This led to a series of surveys, each revealing the need for another. Both turn foremen and general foremen were questioned about the nature of the job, the most important activities, and what skills a foreman needed to perform the job efficiently.

For answers to the last, Armco went to the company's training supervisors. In addition to knowledge of the specific job and its relation to other operations, managerial knowledge was needed in such areas as planning, organization, leading and control, some economics, and all the communications skills—reading, writing, listening and speaking.

Armco decided the managerial aspect of the job needed the most attention and decided to concentrate on it.

Among the measures taken was setting up an assessment center in order to better select foremen. The job candidates go through training exercises under scrutiny of Armco assessors who determine how well the candidates can handle the duties they would face on the job.

"There are many, many dimensions of behavior we could test," says Mr. Saunders, "but the more you look at, the harder it is to evaluate them. We settled on six as most important—controlling, decision-making initiative, leadership, oral communications, planning and personal adaptability."

The program was phased in at one of Armco's steel plants and has since spread to the rest of its mills as well as to some of its non-steel operations. The program is controlled at the corporate level, but most of the formen are selected at the plant sites.

their input, and get their views on the best way to explain the change to the workers. If you do all that, they're more likely to buy into the solution—and push it on the floor."

William C. Byham, president of Development Dimensions, says failures in installing robots usually happen when workers, supervisors and middle managers are not involved in the installation decision.

He lists these reasons why a supervisor would fear installation of a robot:

—Possible loss of a job.

—Difficulty in correcting production errors.

—Having no one to do non-routine tasks, so the supervisor ends up doing them.

—Loss of self-image resulting from managing machines.

—Loss of status when status is defined by the number of employees reporting to him.

—Loss of the challenge that comes from effectively managing people.

—A lack of perceived expertise because the supervisor often cannot fix the robot or doesn't know as much about it as a subordinate.

He indicates that the introduction of robots or automatic work machines onto the shop floor may give rise to a whole new set of problems. He relates one instance where switching over to automatic machines cost the supervisor a pay increase. The reason: Although the quality and volume of the work processed improved, the supervisor was now directing only six people, rather than the previous twelve.

Needless to say, the unions are keeping a close watch of situations like this. They have no intention of letting technological changes rob them of hard-won gains on the shop floor. They intend to be involved in the changes, not bypassed by them. Recently, the International Association of Machinists (IAM) announced it hopes to use technology stewards to monitor the introduction of advanced techniques in the workplace. The use of these stewards, who would be trained by the union, will be brought up this year at IAM negotiations with the machine tool, aerospace and electronics industries.

3—Selection of new foremen can no longer be made on a hit-or-miss basis—the job has become too important.

Picking the fastest or most efficient worker and making him foreman may have been fine 80 years ago, but it makes absolutely no sense in today's highly competitive world.

It can be as direct a route to failure as making the best salesman a sales manager and watching him drown in a sea of paperwork. The best way to see if a man or woman has the innate qualities to be a supervisor is to give him or her a taste of what the job involves. Interestingly, some aspirants who want to be tested and do well at it, find the duties distasteful and change their minds!

The model employee may fit into this category because, always being on time and doing his work well, he never has a chance to directly experience the supervisor at his worst—bawling workers out. And performing such duties may be repugnant to him.

Dr. Byham points out that in testing both women and men for supervisory positions, women, in the aggregate, tend to score a little higher than the men. This doesn't indicate that an individual woman is better than a man, he says, it merely reflects the fact that only the best female employees try out for the job.

Wiliam J. Saunders, Jr. is executive director of the Armco Education Center at Armco Inc. and has overall responsibility in helping to select supervisors as well as other managers.

He makes this interesting observation about leadership behavior as it shows up among candidates being tested. "You notice four types," he says. "First, there's the individual who seeks leadership and gets it from others. Then, there's the person who seeks it, but can't develop followers—there's no followship.

"Third, there's the one who doesn't want leadership and doesn't get it. And finally, there's the person who doesn't seek it, but nevertheless, people gravitate to him—the charismatic leader."

Armco, along with many other companies, uses the assessment center approach in selecting supervisors—giving them a taste of the job beforehand to see how well they can do it and whether they actually want to do it. (For details on how this works at Armco, see box, this page.)

4—Training a foreman—one recently selected or an existing one—is a complex, time-consuming operation that cannot be left to chance. And to be effective it must extend back up the management ladder all the way to the top.

Ronald W. Metz is human resource development manager on the industrial relations staff at Florida Steel Corp. "Over the years," he says, "the first-line supervisor has been grosaly underrated by too many companies.

"Now organizations are beginning to realize that sound training and development of supervisors can really pay off. A passive attitude on management's part is no longer possible.

"But," he adds, "the training can't

begin and end at that level. We also train second-line supervisors on how to reinforce and support the skills the first-line supervisors are developing. And we carry that participation in reinforcement of managing techniques developed on the job floor right up to division superintendents and beyond."

Florida Steel uses a program originated by Development Dimensions called interaction management. It's a behavioral modeling approach designed to help supervisors deal with five basic situations critical to their jobs. These are: improving employee performance and work habits, dealing with absenteeism, handling emotional situations and overcoming resentments.

(For details on how behavioral modeling works at Florida Steel, see box this page.)

An important part in selecting and training foremen at many companies is use of the skills assessment center. The concept was pioneered by Douglas Bray, an industrial psychologist in the human resources division of A. T. & T. in the post-World War II period.

Searching for a technique to measure how well applicants would actually do on the job, he recalled a system used by the British, German and American secret service agencies. To discover how skilled a prospective intelligence agent might be, he was given simulated "on-the-job" training.

For example, the prospect might be asked to assume a false identity and maintain it, though he faced a series of interrogators determined to break him down.

Dr. Bray adapted the principle in assessing potential first-line supervisors at A. T. & T., later expanding it to a wide variety of other managerial positions. It spread to other companies including Westinghouse, Union Carbide, and Caterpillar Tractor.

One of Dr. Bray's associates was William Byham, who introduced the concept in hundreds of companies when he established DDI as a consulting firm. The American Management Associations and others also provide similar services.

Asked by *Iron Age* how the assessment center technique works in selecting foremen, Dr. Byham says the essential difference is the larger number of candidates who must be tested.

"Unlike middle management jobs," he notes, "first-line supervising jobs provide for self-nomination. That means a larger number of candidates must be tested. But basically, the same assessment techniques are used for all levels of management. But in each case they are specifically tailored to the job actually involved."

One constant in skills assessment ever since it began has been the in-basket test. Candidates for a job are given a collection of memos, notes, letters, schedules and similar items and asked to take action on them, if they feel it's necessary.

In the case of candidates for foremen, an exercise in work scheduling is generally included since that task is one of the main responsibilities of the job.

Beyond the in-basket exercise, there are many challenges that can be given the prospective first-line supervisor.

One situation might involve an applicant being asked to be in two places at the same time. He must determine which is more important and why.

Another exercise finds the prospect being asked to juggle conflicting elements in a situation involving costs versus ethics. He's in charge of a factory line that faces a possible equipment breakdown just as his shift is nearing an end. Does he keep the line running and let the foreman on the next shift get stuck with the shutdown? Or does he shut down the line for repairs and adversely affect his operating costs?

Other situations can involve argument about overtime inequities among the workers that he must resolve. There could be an invitation to meet socially with the union—during his first day as foreman.

In this era of technological advance, is the foreman's role expanding or contracting?

What has been said before indicates clearly that it is expanding. But in which direction? Many of those questioned see the foreman moving higher into middle management.

Dr. Byham has pointed out that various studies have shown that the element most overlooked in installing an industrial robot was middle management. This has, naturally, led to hostility and resentment.

As the computer becomes more important on the shop floor, the foreman's interaction with staff personnel, with the office, with maintenance and technical personnel is bound to increase.

In such an atmosphere, the formerly "forgotten man"—the foreman—can no longer be ignored. He is going to have a lot to do with how well American industry operates in the 1980s and 1990s.

Wise managements will select him carefully, train him well, listen to his counsel with a receptive ear and make him, truly, management's representative on the shop floor. □

How Florida Steel Trains Foremen

Several years ago Florida Steel Corp. decided to train its first-line supervisors to deal with the problems they faced each day on the shop floor.

Most of these concerned employee performance and work habits, absenteeism, emotional situations and resentments.

Florida Steel decided to call in Pittsburgh-headquartered consultants Development Dimensions International (DDI) and make use of its interaction management training. Interaction management incorporates behavioral modeling techniques—techniques that make it possible for a supervisor (or any other manager) to handle discussions on behavior with a positive approach.

Ronald Metz, Florida Steel's human resource development manager, explains one segment of the training this way:

"The supervisors see a five or ten minute video tape of a foremen and a supervisor going through a session dealing with poor habits. The supervisor is shown handling the discussion in a positive way.

"That gives the supervisors viewing the tape a positive model as a guide. After this, they receive a detailed analysis of the set of critical steps used in the procedure. They learn the steps. Then, they skill practice the techniques they have been taught, in teams of two, switching roles each time they do. One plays the supervisor and the other plays the employee, and then the roles are reversed. With more practice, these skills are sharpened.

Developing the skills is one matter, Dr. Metz notes. Making sure they get used back on the job is another. Florida Steel and DDI ensured that any gaps would be bridged.

They not only trained the first-level supervisors. They filled in all the management levels above on what was taking place, all the way up to division managers. Mr. Metz keeps in touch with the division managers to make sure the techniques are used.

The initial program went in at Florida Steel's Jackson, Tenn., mill. Since then it has been put in place at all of the company's installations, including those at Charlotte, N.C. and Jacksonville, Tampa and Indiantown Fla.

Reprints available while supply lasts. For single copy, circle No. 92 on inquiry card. Additional copies, $1.00 each, for articles up to 8 pages. Longer ones $2.00 each. Please include payment with orders of $10 or less. Quantity reprints available. For information, write: IRON AGE, Reader Service, Chilton Way, Radnor, Pa. 19089. Ask for reprint No. 4278.

PLANT EQUIPMENT PRODUCTIVITY DOWN

It's down chiefly because a long-lagging economy has forced plants to operate below optimum levels.

BY JOHN D. BAXTER

How has labor productivity been doing in U.S. industry?

You know the answer—not too well.

More specifically, how has labor productivity been doing in manufacturing?

Again, not too well. Actually, it is running lower this yeer than last. And since 1977, labor productivity in manufacturing has moved up at a super-sluggish annual average rate of less than 1 pct (0.8 pct).

That's bad, of course. It's bad for the economy because it breeds inflationary pressures; labor cost hikes have far outrun productivity gains in recent years.

Low labor productivity is bad also because it undermines U.S. industry's competitiveness in world trade. High U.S. unit labor costs open the floodgates to imported manufactured products—and foreclose U.S. products from rich overseas markets.

Low labor productivity, and resulting high unit labor costs of U.S. manufactured products, thus act as a severe restraint on national economic growth. And anything that blocks economic growth, helps bring on high unemployment, monstrous government budget deficits and other national crises and problems.

So, you pass the test on labor productivity in manufacturing and on how that has been hurting the U.S. economy. It was an easy test. After all, labor productivity always has been a widely publicized subject in this country.

But, as any executive in any metalworking industry knows, there's a lot more to productivity than just labor productivity.

Most metalworking industries are capital intensive, not labor intensive. More and more operations in more plants are becoming machine-paced rather than man-paced.

So, what about capital productivity? Or, in another way of looking at it, what about the productivity of capital stock—the machinery and equipment used in manufacturing?

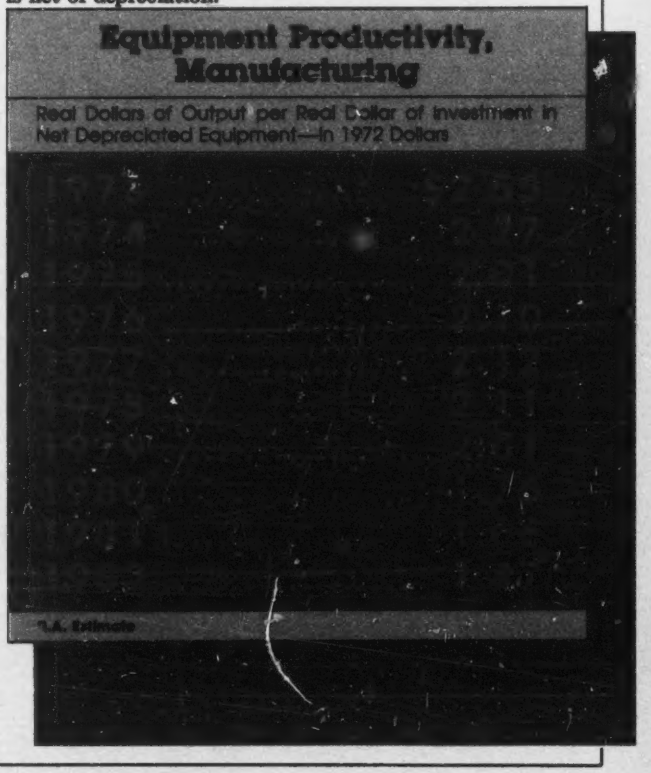
In a word, capital productivity, or equipment productivity, has been faring far worse than labor productivity in this country in recent years—and at the present time. And the 'bad effect' impact of poor equipment productivity on industry and the U.S. economy is just as great as poor labor productivity.

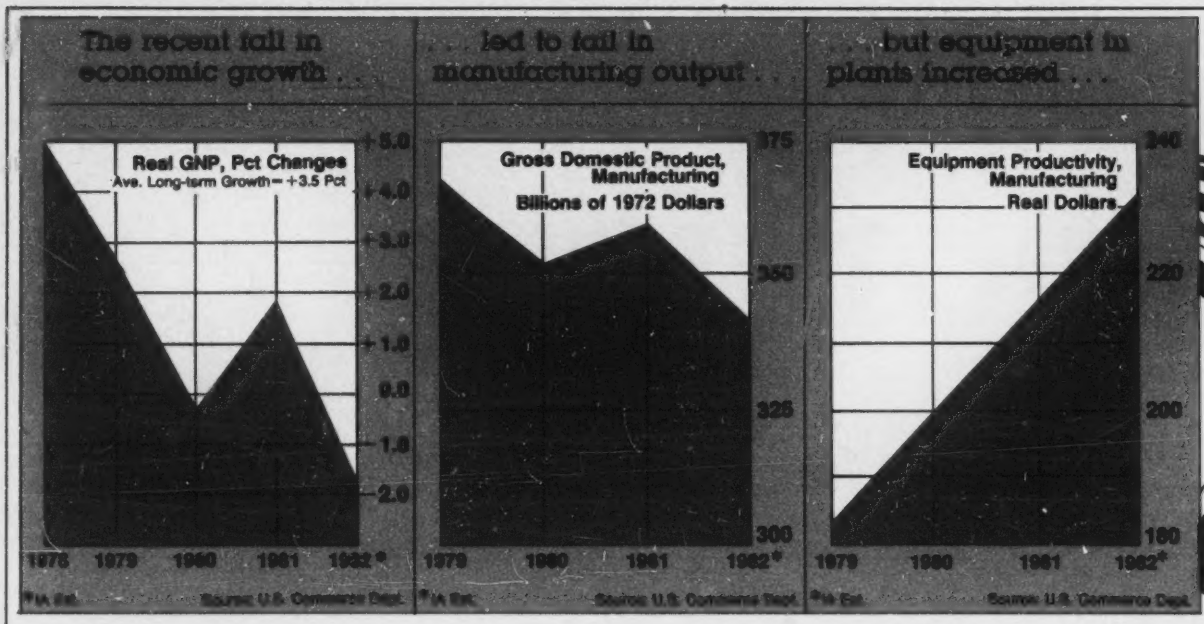
Equipment productivity is far less understood than labor productivity by most people, including some business executives. Too, unlike labor productivity, there are a number of ways to compute equipment productivity. So, before getting into the numbers on the recent performance of manufacturing equipment productivity, a word is needed on the methods behind the measure.

Productivity, in the context used here, refers to the number of dollars of revenue produced for each dollar invested in equipment. Strictly speaking, this is capital productivity. But when the capital referred to is all in manufacturing equipment, then the measure also serves as a good gage of equipment productivity. Investment in structures is excluded.

The input and the output of the productivity measures used here are those favored by several analysts in the U.S. Commerce Dept. The basic data, except for that of 1982 estimates, comes from that department.

Input is the dollar value of equipment used by manufacturers. This dollar value is after adjustment for inflation and is net of depreciation.


Equipment Productivity, Manufacturing
Real Dollars of Output per Real Dollar of Investment in Net Depreciated Equipment—In 1972 Dollars
*U.S. Estimate



Output is the net revenue generated by manufacturing companies from domestic markets only. In official government data language, it is known as manufacturers' Gross Domestic Product. This factor is also inflation-adjusted.

The **productivity** reading from these input and output factors is the number of dollars of revenue collectively produced by U.S. manufacturing industries for each dollar invested in capital machinery and equipment.

(The box appearing with this article gives a more detailed description, and example, of the productivity ratios used here.)

Clearly, the productivity data cited here are not suitable for direct comparisons with company-level measures. As in the case of widely-published data on labor productivity, the figures on equipment are aggregate data and reflect a wide mix of all types of manufacturing industries.

Last year, each dollar's worth of capital equipment used in U.S. manufacturing produced an *Iron Age*—estimated $1.47 worth of output. That was down 11.5 pct from 1981's $1.66 worth of output per dollar value of equipment. Too, the 1982 ratio was 42 pct less than the ratio reached in 1973, the start of the decade.

Plant managers in metalworking know the havoc that can be wreaked in a shop due to machine downtime. Aside from disruptions caused by rescheduling, unit costs soar as shop productivity falls.

In a sense, what recent aggregate data on equipment is all about is economic downtime. Equipment productivity in U.S. manufacturing has fallen in recent years because a long-lagging economy has forced the equipment to be operated far below optimum levels.

A run-through of the four clustered charts here gives a clear picture of this economic downtime. The growth decline in real Gross National Product led directly to a fall in the output of manufacturers. As this output declined, the net stock of manufacturers' equipment rose. So, with more equipment producing less goods, productivity fell sharply.

A natural question raised at this point is: Why has net stock of equipment kept going up? After all, capital investment has been soft for years.

Equipment productivity in manufacturing has been a victim of economic downtime.

True, equipment spending has lagged lately. But it has lagged little in relation to output. For example, over the recent 25 years (1957-81), business real fixed investment as a percent of real GNP averaged 10.0 pct per year. In 1982, this figure was an estimated 10.7 pct, based on three quarters of actual data.

It is worth noting that the recent relatively high rates of investment as a percent of GNP are not reassuring to many plant investment analysts. Much of that net stock of equipment is known to be obsolete in light of recent advances in automated equipment.

Another reason for the continued growth of net stock of equipment is that once acquired, the equipment remains on hand for many years. There is a cumulative buildup of such stock, and when output falls off, this buildup phenomena worsens the effect on equipment productivity.

Also, recent economic growth has been more volatile than in the past. Equipment investment, a necessarily long-term commitment, often has been 'caught short' as negative growth years closely followed on the heels of solid growth years. This built up net stock of equipment in relation to output needs.

Cases in point: In the 1963-72 decade, **four** of the years had economic growth rates below the postwar annual average of 3.5 pct, and **one** of those years had negative growth. In the 1973-82 period, **six** of the years had growth below the long-term average, and **four** of the years were actually in the red. "That," as one economist has said, "is red-hot volatility."

So, data on capital productivity, or equipment productivity, may be of some interest in its own right. Certainly, it is not often seen; labor productivity dominates the subject area.

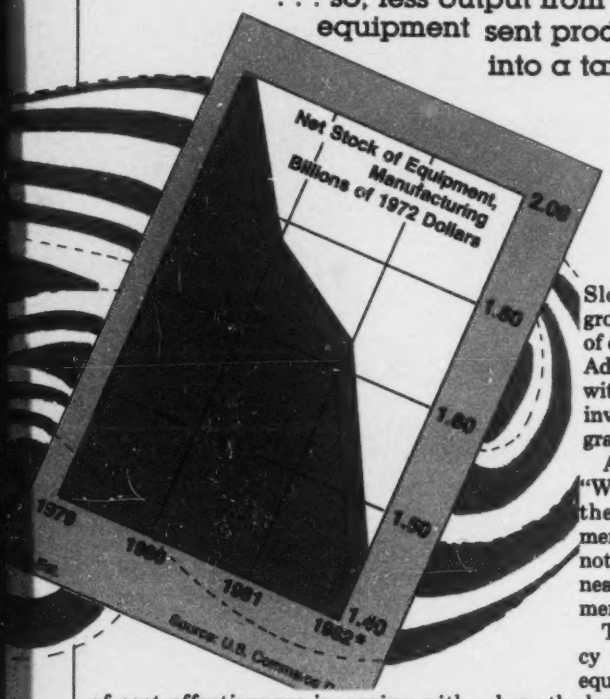
But how about the use of such data and measures?

There are productivity specialists, consultants and others who believe more attention must be given to this 'forgotten' area of productivity. They see the need for greater insights by both makers of national economic policies and by industry executives at the company level.

One important reason is the spiraling costs of credit and capital that have swept with hurricane force through the U.S.—and world—economic scene in recent years. It is not a short-term matter; new levels of costs have been reached.

High money costs call for new levels

. . . so, less output from more equipment sent productivity into a tailspin.



Slow and bumpy economic growth has made a shambles of equipment investment. The Administration has come up with the most liberal capital investment writeoff rules ever granted, but to no avail.

As one accountant notes, "When business is really bad, the after-tax cost of equipment, however low, is simply not a real incentive for business managers to buy equipment."

The more insight that policy makers have into capital equipment productivity, perhaps the better they can set policies to help it. So far, all policies designed to boost capital investment or productivity have been helpful only when business is moving ahead on its own right.

It may be beyond the reach of policy makers to provide what is most needed to boost capital investment or productivity—steady economic growth. But some experts see a place for more realistic policies that are designed to help when things aren't good.

of cost-effectiveness in coping with them. And that boils down to optimizing capital productivity. And where the capital flows into manufacturing equipment, there is an intensified need for increased equipment productivity. The high capital costs must be recouped. It can be done only through increased productivity.

At the national level, policy makers, in dealing with equipment productivity problems, have been frustrated lately.

The stress in Washington on labor productivity isn't likely to solve the equipment productivity problem, say some experts. This point was brought out by the General Accounting Office in 1980 when it recommended a plan be developed "for providing multi-factor measures for the major sectors of the economy."

At the business manager level, the figures on plant equipment productivity show him how efficiently overall U.S. manufacturing is operating.

The aggregate data reflects conditions in thousands of U.S. factories.

Some management consultants, with their overview of operations in many plants, contend that equipment productivity concern is given short shrift by many U.S. companies.

Says Peter F. Drucker, "Despite its importance and payoff, not many business managers pay much attention to the productivity of capital, let alone work systematically at raising it."

And capital productivity, as noted earlier, is what equipment productivity is all about.

Consultant Drucker and others report that many companies have more refined measures of labor productivity than they do for equipment, or capital, productivity. Capital/output ratio analysis is used fairly widely, they say, but it often has a broader base than production equipment. Yet, companies are becoming more capital intensive all the time.

Notes C. Jackson Grayson, chairman of the American Productivity Center, "Productivity measures based solely on labor input are of limited value in many industries, especially those which are capital intensive."

Some see an irony in continued emphasis by managers on labor productivity.

U.S. industry has undergone—and is undergoing—a great upheaval in the labor/capital equation. This is based chiefly on recent union give-backs, tougher managment labor negotiations and fast-growing use of highly automated equipment.

One consultant has noted that, "Direct labor may no longer be the area of opportunity for greatest productivity for U.S. companies."

In sum, it looks like non-labor productivity may soon take on a more important role both at the national policy-making level and in U.S. factories. The aggregate data certainly points to that need. □

How Productivity is Figured

There are several ways to calculate manufacturing equipment productivity, but the approach used here is one favored by some U.S. Commerce Dept. experts.

Input net constant dollar investment in equipment in use by U.S. manufacturing industries. This input comprises the investment value of manufacturers' equipment less depreciation and after allowing for inflation.

Output in the productivity ratio is gross domestic product of manufacturers. In other words, output comprises the gross revenues generated in this country by U.S. manufacturers. It is their total domestic value added. These revenues are inflation-adjusted also.

It all adds up that what is being measured is the inflation-adjusted market value of domestic output of manufacturers produced by each dollar's worth of equipment—that equipment value being less depreciation and adjusted for inflation.

For example, U.S. manufacturers in 1982 had an estimated gross domestic output of $341 billion. They achieved that output by using capital machinery and equipment valued at $233 billion. That meant that each dollar of equipment accounted for $1.47 worth of output.

Now, look at the chart on plant equipment productivity. Compare the $1.47 produced by each dollar's worth of equipment in 1982 with the $2.55 produced in 1973. This shows that productivity of equipment used in U.S. manufacturing was down a very steep 42 pct between 1973 and 1982.

Reprints available while supply lasts. For single copy, circle No. 91 on inquiry card. Additional copies, $1.00 each, for articles up to 8 pages. Longer ones $2.00 each. Please include payment with orders of $10 or less. Quantity reprints available. For information, write: IRON AGE, Reader Service, Chilton Way, Radnor, Pa. 19089. Ask for reprint No. 4277.

Recession Blunts Japan's Growth

Japanese machine tool companies have been hit hard by the recession—especially in the latter half of 1982.

While machine tool production in Japan for the first 8 months was only down 2.3 pct for a value of $2.2 billion, orders were far more discouraging. In the first nine months of 1982, orders were down 12.5 pct in value.

Even numerically controlled machine tools felt the economic crunch. Production of NC machines was down just 1 pct from 1981; in fact, the value of the 16,698 units produced in the first 8 months of 1982 was 2.3 pct above the value of those NC machines produced in the similar period of 1981.

But, again, orders told a different story. The first nine months saw NC machine tool orders down 8 pct from the comparable '81 period.

Export orders were also down 25 pct.

The trend in orders suggests that the bottom of the trough may not have been reached yet. In any case, little growth can be expected in the next six months, and the value of orders, already well below the value of production could fall further before an improvement is seen.

Over the past few years, machine tool production in Japan has increased rapidly, especially in NC machines. Despite the current downturn, which is worldwide, Japan is still very much a world competitor.

As the "newly industrialized nations" such as South Korea, Taiwan and Singapore, begin to take some market share at the low end of the spectrum, Japanese companies are responding by adding more value to their machines, as the spate of FMS on display at Osaka demonstrated.

For example, in 1981 the value of production of machine tools amounted to $3.8 billion, up 24.8 pct from 1980. NC machine tool sales increased by 27.9 pct in 1981 over 1980 to a value of $1.9 billion.

However, the actual number of NC machines produced increased by just 17.6 pct, indicating that the value of each machine is being increased.

Exports from Japan rose in 1981 over 1980 by 15 pct to $1.4 billion, with numerically controlled machine tools accounting for $895 million, almost 70 pct of exports.

The biggest buyer of Japanese machine tools by far has been the U.S.A. which took 51 pct of the export total in 1981. Europe bought 20 pct, and the Eastern Bloc countries, 7 pct.

Meanwhile imports of machine tools to Japan in 1981 were worth only $157.9 million, up just 1 pct from the previous year. Generally, Japanese companies buy high-technology machines overseas, with 31 pct coming from West Germany, 24 pct from Switzerland and 20 pct from the U.S.A.

Japanese Machine Tool Industry

Producton and Orders, Millions of Dollars

1981	
Total sales	**3887.5**
NC machines	1968.2
Including:	
NC lathes	731.3
Machining centers	749.8
Milling machines	119.3
Total exports	**1409.1**
Including:	
NC Lathes	507.7
Machining centers	431.2
NC milling machines	40.2
1982 (first 8 months)	
Total production	**2200.2**
Lathes	149.8
Milling machines	119.7
NC machines	1194.2
Total orders	**1672.8**
Including:	
NC machines	926.2
Exports	374.9

(Cont. from p. 57)

pallet holders on a rotary table.

Niigata is about to install its FMS to machine parts for machine tools. The company developed this system from one built to produce cylinder heads for Niigata's big diesel engines. This system is designed for large workpieces, and is based on one HN80A and one HN50A machining center.

The automatic workpiece loading/unloading system is specifically designed for free disposal of swarf. A significant feature of this system is a loop-type optical fiber data highway which can serve up to 15 units, including CNC machines, terminals and trolleys.

One minicomputer can control four loops, thus providing the base for a completely computerized manufacturing system. Since a CNC machine can be plugged into the loop via an interface unit, without the need for parallel cables running to the minicomputer, the system can be expanded easily.

Clearly, that is the data highway most suitable for FMS, and points one way ahead.

Robot arms are also becoming essential features of machine tools, so it was not surprising that companies such as Yamasaki, Okuma, Ikegai and Hitachi Seiki have developed arms that can be fitted to their machines.

Daikin Industries was one of the independent companies showing a robot arm that can be mounted on the front of a machine. The arm articulates on a horizontal spindle, and can also move longitudinally in its housing. Then, the wrist can rotate.

Toyama introduced its cylindrical coordinate robot for parts handling at machine tools. The Toyama RP-1 has a capacity of 110 lb, including the hand, and has up to six degrees of freedom.

Aida Engineering also showed its new A-1 electro-hydraulic robot, designed principally for handling at presses. Fanuc, too, was showing its new S-Model robots, which have jointed arms. There are models with gripper capacities of 22, 44 and 66 lb in the range, but these are intended for arc welding, spraying and laying sealant, not for use in machine shops.

Machine monitoring was also spotlighted at the Osaka Show. Hitachi Seiki's version of the all-important machine monitor system differs from most others in that it measures the current needed to provide the necessary thrust at the tool to cut metal, not the current at the main spindle. If the current increases 20 pct above normal, the feed rate is reduced, and if the current is still too high, then a new tool is fitted.

In evidence at the Fanuc, Yaskawa and Mitsubishi Electric stands were ac servo motors. Although these motor types require complex electronic circuitry, they are much lighter than dc servo motors of the same output, and as they are brushless, maintenance costs are low. These can be expected to come into use much more widely in the future.

There were other signposts at Osaka, apart from the big one to FMS. CNC has made profile millers redundant for die making. Mitsui Seiki was one of the companies showing a CAD/CAM system for use with a CNC machining center to produce dies quickly.

In addition, CAD/CAM is rapidly reaching the stage where the engineer will be able to control complete design and machining operations. □

Reprints available while supply lasts. For single copy, circle No. 90 on inquiry card. Additional copies, $1.00 each, for articles up to 8 pages. Longer ones $2.00 each. Please include payment with orders of $10 or less. Quantity reprints available. For information, write: IRON AGE, Reader Service, Chilton Way, Radnor, Pa. 19089. Ask for reprint No. 4276.

EFFECTIVE JANUARY 10, 1983

MATERIALS NEWSFRONT

Price & Production Data

Important Notice About Iron Age Scrap Prices

Beginning with the Jan. 21 issue Iron Age will publish only one set of scrap prices per issue—those with the effective date as close to the issue date as printing schedules permit.
Prices for other weeks will continue to be available on a weekly basis through our Metal Price Phone Hotline or through our Weekly Price Newsletter. (For details on these services see ad on pg. 65.)

Lake Superior Ore Prices

51.50% Fe Natural delivered lower Lake ports. Rail transportation, handling and unloading may be charged to the account of the buyer. Coarse ore 80¢ premium.

Pellets (per iron unit natural)..... gross-ton 80.50-86.9*
Old range, non-bessemer ..... gross-ton $32.78
Mesabi, regular-unscreened ..... gross-ton $32.53
Mesabi, non-bessemer.....gross-ton $32.25-32.53**

*80.50¢—Pickands Mather as of 1/27/81.
**86.9¢—U. S. Steel as of 3/15/82. Cleveland-Cliffs as of 2/26/82, Oglebay Norton as of 3/25/82, and Hanna Mining as of 2/26/82.

Steel Production, Composite Prices

(Effective January 10, 1983)

U.S. Steel Production	Last Week	Two Weeks Ago	To Date 1983	To Date 1982
Net tons, in thousands	1,136	898	1,264	2,004
Capability Utilization Rate	39.2	30.4	38.2	59.5

Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel Base* (¢/lb.—eff. 4/4/82)	25.297	25.297	25.297	25.195
Pig Iron** (Net ton=2000 lbs.)	$213.00	$213.00	$213.00	$213.00
Scrap No. 1 hvy.*** (Gross ton=2240 lbs.)	$ 60.17	$ 57.50	$ 52.17	$ 75.50
No. 2 bundles	$ 41.83	$ 40.83	$ 38.50	$ 54.17
Scrap Comparison (Gross Ton)				
No. 1 steel, Pittsburgh	$ 62.50	$ 62.50	$ 52.50	$ 85.50
No. 1 steel, Philadelphia	56.50	54.50	54.50	66.50
No. 1 steel, Chicago	61.50	55.50	49.50	74.50
No. 1 bundles, Detroit	48.50	48.50	41.50	74.50
Low Phos., Youngstown	64.50	51.50	51.50	85.50
No. 1 mach'y cast., Pgh	61.50	61.50	61.50	93.50
No. 1 mach'y cast., Phila	98.50	98.50	98.50	111.50
No. 1 mach'y cast., Chi	104.50	104.50	104.50	120.50

*Finished Steel Composite
Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.
**Pig Iron Composite
Based on average prices for basic and foundry pig iron at representative producing points within the U.S.
***Steel Scrap Composite
Average of No. 1 hvy. melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Nonferrous Prices

(Effective January 10, 1983)
Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated.

Primary Metal Prices

(cents per lb.)	current price	last price	date of change
Aluminum	76.00 (Nom.)	76.00-80.00	1/4/82
Copper (C)	76.00-77.50	75.00-76.50	1/10/83
Lead	22.00-23.00	21.50-23.00	1/7/83
Magnesium Ingot	134.00	125.00	6/1/81
Nickel	329.00	350.00	11/25/81
Titanium Sponge	555.00-585.00	555.00	4/29/82
Zinc	38.00-40.00	36.00-40.00	1/3/83

ALUMINUM: 99.5%. COPPER (C) = cathode. LEAD: common grade. MAGNESIUM: 99.8% pig. Velasco, Tex. NICKEL: electro., Port Colborne, Canada. ZINC: high grade.

Antimony, American Laredo, Texas . $2.00
Beryllium-aluminum 5% Be, per lb. contained Be $201.00
Beryllium-copper, per lb. cont. Be $121.00
Beryllium 97% powder 200 ..... $166.00
Bismuth, ton lots ..... $1.25-$1.40
Cadmium, under one ton ..... $1.05-$1.15
Calcium, ton lots, crown $3.05
Chromium, 99.8% $3.75
Cobalt, 99%, cathode $12.50
Gold per troy oz. $474.00
Indium, dollars per troy oz..... $2.60-$2.85
Iridium, dollars per troy oz..... $600
Magnesium sticks, 10,000 lbs. $1.91
Mercury, per 76-lb. f.o.b. N.Y. ..$360-$375
Molybdenum, lb. tech. moly oxides, 20 lb. MO can $5.85

Nickel oxide sinter at U.S. points of entry $3.12
Palladium, per troy oz. $140
Platinum, per troy oz. $475
Rhodium, per troy oz. $600.00
Silver ingots, per troy oz..... $12.05
Vanadium $4.94
Zirconium sponge..... $12.00-$17.00
(Per lb. unless otherwise noted)

Straits Tin Price

(U.S. cents per lb, EX-SMELTER, based on daily market in Penang in Malaysian dollars per kilo.)

Jan. 3—573.59
Jan. 4—575.44
Jan. 5—576.36
Jan. 6—576.89
Jan. 7—577.82

Scrap Prices

Brass Mill Scrap

(Cents per lb; over 20,000 lbs. add 1¢ per lb)

	Solids	Turning
Copper	69½	60¼
Yellow brass	60⅛	53⅛
Red brass	64⅜	55⅛
Comm. bronze	65⅝	56½
Mang. bronze	59¼	57½
Free cutting rod ends	44	43

Custom Smelters Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	63
No. 2 copper wire	56
Light copper	47

Ingot Makers Scrap

(Cents per lb., carload lots, del. refinery)

No. 1 copper wire	59
No. 2 copper wire	52
Light copper	43
No. 1 composition	51
No. 1 comp. turnings	48
Hvy. yellow brass solids	34
Hvy. yellow brass turnings	26
Radiators	42

Aluminum

New mixed clips	25	—26
Old sheet	24	—25
Old cast	24	—25
Clean dry borings	24	—25

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Aluminum

Segregated clippings	22	—23
Mixed L.C. clips	20	—21
Old sheets and cast	14	—15
Borings and turnings	10	—11
Duraluminum clippings	20	—21

Copper and Brass

No. 1 copper wire	48	—49
No. 2 copper wire	41	—42
Light copper	35	—36
Radiators	34	—35
No. 1 composition	42	—43
No. 1 composition turn'gs	40	—41
Cocks and faucets	29	—30
Clean heavy yellow brass	27	—28
Brass Pipe	29	—30
New soft brass clippings	35	—36

Lead

Heavy soft lead	9	—10
Whole batteries	4	— 5
Type metal	14	—15
Electrotype	18	—19

Nickel

Nickel solids	85	— 90
Nickel rod ends	85	— 90
Nickel sheets, clips	85	— 90
Nickel turnings	40	— 45

Zinc

New zinc clippings	14	—15
Old diecast zinc	7	— 8

EFFECTIVE JANUARY 10, 1983

MATERIALS NEWSFRONT

(Effective January 10, 1983) Prices obtained in trade based on representative tonnages per gross ton delivered to consumer unless otherwise stated. Prices are the opinions of *Iron Age* editors and correspondents, based on contacts with dealers, brokers, generators and users in the industry on the effective date listed above.

Ferrous Scrap Prices

Pittsburgh

No. 1 hvy. melting	$ 62.00 to	$ 63.00
No. 2 hvy. melting	54.00 to	55.00
No. 1 dealer bundles	72.00 to	73.00
No. 1 factory bundles (auto)	68.00 to	69.00
No. 2 bundles	41.00 to	42.00
No. 1 busheling	69.00 to	70.00
Machine shop turn.	6.00 to	7.00
Shoveling turnings	20.00 to	21.00
Cast iron borings	18.00 to	19.00
Low phos. punchings plate	74.00 to	75.00
Heavy turnings	50.00 to	51.00
No. 1 RR hvy. melting	71.00 to	72.00
Rails 2 ft. and under	81.00 to	82.00
Scrap rails, random lgth.	76.00 to	77.00
RR specialties	75.00 to	76.00
No. 1 machinery cast	61.00 to	62.00
Cupola cast	54.00 to	55.00
Heavy breakable cast	30.00 to	31.00
Stainless		
18-8 bundles and solids	440.00 to	450.00
18-8 turnings	340.00 to	350.00

Chicago

No. 1 hvy. melting	$ 61.00 to	$ 62.00
No. 2 hvy. melting	52.00 to	53.00
No. 1 dealer bundles	70.00 to	71.00
No. 1 factory bundles (auto)	70.00 to	71.00
No. 2 dealer bundles	44.00 to	45.00
No. 1 busheling	66.00 to	67.00
Shredder scrap	66.00 to	67.00
Machine shop turn.	14.00 to	15.00
Mixed bor. and turn.	15.00 to	16.00
Shoveling turnings	19.00 to	20.00
Cast iron borings	33.00 to	34.00
Low phos. forge crop	79.00 to	80.00
Low phos. punchings plate 1/4 in. and heavier	84.00 to	85.00
Low phos. 2 ft. and under	79.00 to	80.00
No. 1 RR hvy. melting	63.00 to	64.00
Scrap rails, random lgth.	62.00 to	63.00
Reroller rails	90.00 to	91.00
Rails, 2 ft. and under	82.00 to	83.00
RR couplers and knuckles	69.00 to	70.00
RR car axles	99.00 to	100.00
No. 1 machinery cast	104.00 to	105.00
Cupola cast	90.00 to	91.00
Stove plate	78.00 to	79.00
Steel car wheels	69.00 to	70.00
Stainless		
18-8 bundles and solids	380.00 to	390.00
18-8 turnings	280.00 to	290.00
430 bundles and solids	90.00 to	95.00
430 turnings	65.00 to	70.00

Philadelphia

No. 1 hvy. melting	$ 55.00 to	$ 58.00
No. 2 hvy. melting	49.00 to	52.00
No. 1 dealer bundles	70.00 to	73.00
No. 2 dealer bundles	38.00 to	41.00
No. 1 busheling	70.00 to	73.00
Shredder scrap	67.00 to	70.00
Machine shop turn.	18.00 to	21.00
Mixed bor. and turn.	18.00 to	21.00
Shoveling turnings	33.00 to	36.00
Clean cast chemical borings	40.00 to	43.00
Low phos. 5 ft. and under	67.00 to	70.00
Low phos. 2 ft. punchings	85.00 to	88.00
Electric furnace bundles	79.00 to	82.00
RR specialties	74.00 to	77.00
Rails, 2 ft. and under	89.00 to	92.00
Cupola cast	56.00 to	59.00
Heavy breakable cast	53.00 to	56.00
No. 1 machinery cast	97.00 to	100.00

Detroit

Broker buying prices per gross ton on cars:

No. 1 hvy. melting	$ 41.00 to	$ 42.00
No. 2 hvy. melting	39.00 to	40.00
No. 1 dealer bundles	48.00 to	49.00
No. 2 bundles	20.00 to	21.00
No. 1 busheling	47.00 to	48.00
Drop forge flashings	25.00 to	26.00
Machine shop turn.	15.00 to	16.00
Mixed borings and turn.	6.00 to	7.00
Shoveling turnings	15.00 to	16.00
Cast iron borings	5.00 to	6.00
Heavy breakable cast	24.00 to	25.00
Mixed cupola cast	40.00 to	41.00
Automobile cast	60.00 to	61.00
Stainless		
18-8 bundles and solids	315.00 to	325.00
18-8 turnings	215.00 to	225.00
430 bundles and solids	75.00 to	85.00

Youngstown

No. 1 hvy. melting	$ 59.00 to	$ 60.00
No. 2 hvy. melting	49.00 to	50.00
No. 1 dealer bundles	66.00 to	67.00
No. 2 dealer bundles	39.00 to	40.00
Machine shop turn.	2.00 to	3.00
Shoveling turnings	7.00 to	8.00
Low phos. plate	64.00 to	65.00
Electric furnace bundles	65.00 to	66.00
Galvanized bundles	59.00 to	60.00

Cleveland

No. 1 hvy. melting	$ 53.00 to	$ 54.00
No. 2 hvy. melting	24.00 to	25.00
No. 1 dealer bundles	55.00 to	56.00
No. 1 factory bundles	61.00 to	62.00
No. 2 bundles	22.00 to	23.00
No. 1 busheling	58.00 to	59.00
Machine shop turn.	2.00 to	3.00
Mixed bor. and turn.	2.00 to	3.00
Shoveling turnings	5.00 to	6.00
Cast iron borings	5.00 to	6.00
Cut structural & plates, 2 ft. and under	84.00 to	85.00
Low phos. punchings plate	84.00 to	85.00
Drop forge flashings	33.00 to	34.00
Foundry steel, 2 ft. & under	59.00 to	60.00
No. 1 RR hvy melting	63.00 to	64.00
Rails, 2 ft. and under	89.00 to	90.00
Rails, 18 in. and under	90.00 to	91.00
Steel axle turnings	69.00 to	70.00
Railroad cast	82.00 to	83.00
No. 1 machinery cast	79.00 to	80.00
Cupola cast	62.00 to	63.00
Stove plate	47.00 to	48.00
Stainless		
18-8 bundles	275.00 to	285.00
18-8 turnings	225.00 to	235.00
430 bundles	75.00 to	85.00

Buffalo

No. 1 hvy. melting	$ 25.00 to	$ 26.00
No. 2 hvy. melting	15.00 to	16.00
No. 1 busheling	30.00 to	31.00
No. 1 dealer bundles	28.00 to	29.00
No. 2 bundles	12.00 to	13.00
Machine shop turn.	1.00 to	2.00
Mixed bor. and turn.	8.00 to	9.00
Shoveling turnings	10.00 to	11.00
Cast iron borings	8.00 to	9.00
Low phos. plate	48.00 to	49.00
Structural and plate, 2 ft. and under	46.00 to	47.00
Rails, 2 ft. and under	42.00 to	43.00
Scrap rails, random lgth.	22.00 to	23.00
No. 1 machinery cast	63.00 to	64.00
No. 1 cupola cast	42.00 to	43.00

St. Louis

No. 1 hvy. melting	$ 52.00 to	$ 53.00
No. 2 hvy. melting	44.00 to	45.00
Foundry steel, 2 ft.	44.00 to	45.00
No. 1 dealer bundles	52.00 to	53.00
No. 2 bundles	41.00 to	42.00
Machine shop turn.	12.00 to	13.00
Shoveling turnings	18.00 to	19.00
Cast iron borings	30.00 to	31.00
No. 1 RR hvy. melting	52.00 to	53.00
Rails, random length	49.00 to	50.00
Rails, 18 in. and under	64.00 to	65.00
RR specialties	80.00 to	81.00
Cupola cast	70.00 to	71.00
Heavy breakable cast	48.00 to	49.00
Stove plate	70.00 to	71.00
Cast iron car wheels	49.00 to	50.00
Rerolling rails	84.00 to	85.00
Unstripped motor blocks	55.00 to	56.00

Birmingham

No. 1 heavy melting	$ 54.00 to	$ 55.00
No. 2 heavy melting	52.00 to	53.00
No. 1 dealer bundles	54.00 to	55.00
No. 2 bundles	40.00 to	41.00
No. 1 busheling	52.00 to	53.00
Shredder scrap	69.00 to	70.00
Machine shop. turn.	18.00 to	19.00
Shoveling turnings	25.00 to	26.00
Cast iron borings	26.00 to	27.00
Electric furnace bundles	53.00 to	54.00
Elec. furnace, 3 ft. & under	50.00 to	51.00
Structural and plate, 2 ft.	70.00 to	71.00
Structural and plate, 4 ft.	66.00 to	67.00
No. 1 RR hvy. melting	54.00 to	55.00
Scrap rails, random lgth.	52.00 to	53.00
Rails, 18 in. and under	73.00 to	74.00
Angles and splice bars	65.00 to	66.00
No. 1 cupola cast	74.00 to	75.00
Unstripped motor blocks	52.00 to	53.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 33.00 to	$ 34.00
No. 2 hvy. melting	32.00 to	33.00
No. 1 dealer bundles	34.00 to	35.00
No. 2 bundles	21.00 to	22.00
Machine shop turn.	1.00 to	2.00
Shoveling turnings	3.00 to	4.00
Cast iron borings	4.00 to	5.00
Low phos. 18 in. and under	58.00 to	59.00
Rails, random length	40.00 to	41.00
Rails, 2 ft. and under	65.00 to	66.00
No. 1 cupola cast	50.00 to	51.00
Heavy breakable cast	20.00 to	21.00
Drop broken cast	62.00 to	63.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 26.00 to	$ 27.00
No. 2 hvy. melting	22.00 to	24.00
No. 2 dealer bundles	22.00 to	23.00
Mixed bor. and turn.	7.00 to	8.00
Machine shop turn.	4.00 to	5.00
Shoveling turnings	10.00 to	12.00
Clean cast. chem. borings	34.00 to	35.00
No. 1 machinery cast	89.00 to	90.00
Mixed yard cast	38.00 to	39.00
Heavy breakable cast	14.00 to	15.00
Stainless		
18-8 prepared solids	360.00 to	385.00
18-8 turnings	255.00 to	275.00
430 prepared solids	70.00 to	80.00
410 solids	60.00 to	70.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 28.00 to	$ 30.00
No. 2 hvy. melting	20.00 to	22.00
No. 1 dealer bundles	28.00 to	30.00
No. 2 bundles	16.00 to	18.00
No. 1 busheling	28.00 to	30.00
Shredder scrap	38.00 to	40.00
Machine shop turn.	1.00 to	2.00
Shoveling turnings	1.00 to	2.00
No. 1 machinery cast	100.00 to	105.00
Mixed cupola cast	23.00 to	25.00
Heavy breakable cast	4.00 to	6.00

San Francisco

No. 1 hvy. melting	$ 39.00 to	$ 41.00
No. 2 hvy. melting	31.00 to	33.00
No. 1 dealer bundles	26.00 to	28.00
No. 2 dealer bundles	11.00 to	13.00
Machine shop turn.	4.00 to	6.00
Cast iron borings	4.00 to	6.00
No. 1 cupola cast	83.00 to	85.00

Los Angeles

No. 1 hvy. melting	$ 38.00 to	$ 40.00
No. 2 hvy. melting	27.00 to	29.00
No. 1 dealer bundles	25.00 to	27.00
No. 2 dealer bundles	8.00 to	10.00
Machine shop turn.	4.00 to	6.00
Shoveling turnings	8.00 to	10.00
Cast iron borings	4.00 to	6.00
Elec. furnace, 1 ft. and under (foundry)	84.00 to	86.00
No. 1 cupola cast	86.00 to	88.00

Seattle

No. 1 hvy. melting	$ 53.00 to	$ 55.00
No. 2 hvy. melting	42.00 to	44.00
No. 2 bundles	32.00 to	34.00
No. 1 cupola cast	88.00 to	90.00
Mixed yard cast	78.00 to	80.00

Hamilton, Ont.

Brokers buying price per net ton on cars:

No. 1 heavy melting	$ 33.00
No. 2 heavy melting cut 2 ft. and under	30.00
No. 1 dealer bundles	40.00
No. 2 bundles	5.00
Mixed steel scrap	17.00
Bush. new fact. prep'd.	38.00
Bush. new fact. unprp'd.	30.00
Machine shop turn.	18.00
Short steel turn.	21.00
Mixed bor. and turn.	10.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$ 52.00 to	$ 53.00
No. 2 hvy. melting	40.00 to	41.00
No. 2 bundles	28.00 to	30.00
Machine shop turn.	12.00 to	13.00
Crushed turnings	24.00 to	26.00
Shredder scrap	52.00 to	53.00
Cut structural plate 2 ft. and under	74.00 to	76.00
Unstripped motor blocks	55.00 to	57.00
Cupola cast	64.00 to	65.00